**AP Stat: Ch. 23 notes**

Inference:

Ch. 23:

* Estimating the population mean
* We always list \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the mean
* So if we don’t know the mean, then we CAN’T know…
* This chapter will we be estimating 2 things:
* What statistics do we use to estimate mean and std. dev?
* What is the sampling distribution for a sample mean?
* But we don’t know \_\_\_\_\_\_ and \_\_\_\_\_\_ so we will use:
* Our new model: Student’s t-distibution

***Student’s t-model:***

* Family …
* Similar to normal model
* Model changes based on …
* Degrees of freedom (df) =
* Generally …
* Larger the sample size….

***1-sample t-interval:***

CONDITIONS:











Checking #3:

Normal Probability Plot:

MECHANICS:

INTERPRETATION: We are \_\_\_\_% confident that the true mean of \_\_\_\_\_\_ is between \_\_\_\_\_\_\_ and \_\_\_\_\_\_ units.

**Example:** A coffee vending machine dispenses coffee into a paper cup. You’re supposed to get 10 ounces of coffee, but the amount varies slightly from cup to cup. Below are the amounts measured in a random sample of 20 cups. Is there evidence that the machine is shortchanging customers? Construct a 95% confidence interval.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 9.9 | 9.7 | 10.0 | 10.1 | 9.9 |
| 9.6 | 9.8 | 9.8 | 10.0 | 9.5 |
| 9.7 | 10.1 | 9.9 | 9.6 | 10.2 |
| 9.8 | 10.0 | 9.9 | 9.5 | 9.9 |

***1-sample t-Test:***

* Inference about the mean of a population

HYPOTHESES:

CONDITIONS:

MECHANICS:

CONCLUSION:

**Example:** The EPA wants to show that “the mean carbon monoxide level of air pollution is higher than 4.9.”  Does a random sample of 50 readings (with sample mean of 5.1 and sample std. deviation of 1.17) present sufficient evidence at the .05 level of significance to support the EPA’s claim?  Previous studies have indicated that such readings have an approximately normal distribution.

**T- Test and T-Interval Practice Problems**

1. A survey was conducted involving 250 families living in a city. The average amount of income tax paid per family in the sample was $3540 with a standard deviation of $1150. Establish and interpret a 99% confidence interval estimate for the taxes paid by families in this city.
2. The estimated U.S. intake of trans-fatty acids is 8 g per day. Consider a research project involving 150 individuals in which their daily intake of trans-fatty acids was measured. Suppose the average fatty acid intake from this sample was 12.5 g, with a standard deviation of 7.7 g. Test the research hypothesis that the average intake has increased at α = 0.05.
3. Suppose that in a sample of 36 bottles from a certain bottling machine, the machine filled the bottles with an average of 16.1 ounces of cola. The sample had a standard deviation of 0.11 ounces. Give a 90% confidence interval for the mean number of ounces. Interpret this interval.
4. The average stay in days for nongovernmental not-for-profit hospitals is given to be 7.2 days. A sample of 50 such hospitals was selected to test the hypothesis that the average stay is different from the national average. The data collected is below. Is this sufficient evidence to reject the null hypothesis? Use α = 0.01.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5 | 6 | 10 | 11 | 6 | 8 | 9 | 2 | 8 | 9 |
| 6 | 7 | 3 | 13 | 5 | 4 | 10 | 7 | 9 | 4 |
| 8 | 5 | 4 | 4 | 8 | 5 | 2 | 3 | 6 | 6 |
| 3 | 8 | 7 | 2 | 7 | 6 | 9 | 8 | 2 | 2 |
| 4 | 9 | 9 | 1 | 7 | 7 | 1 | 4 | 5 | 1 |